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(11) **EP 0 919 929 A1**

(12)

# EUROPEAN PATENT APPLICATION

published in accordance with Art. 158(3) EPC

(43) Date of publication:

02.06.1999 Bulletin 1999/22

(51) Int. Cl.<sup>6</sup>: **G06F 12/14**, **G06F 15/00**,  
**G06F 15/76**

(21) Application number: 98928551.5

(86) International application number:  
PCT/JP98/02701

(22) Date of filing: 18.06.1998

(87) International publication number:  
WO 98/58319 (23.12.1998 Gazette 1998/51)

(84) Designated Contracting States:  
DE FR GB IT NL

(30) Priority: 18.06.1997 JP 161666/97

(71) Applicant:  
Kabushiki Kaisha Optrom  
Miyagi-ken 989-3124 (JP)

(72) Inventors:  
• SHIGETOMI, Takashi  
Kabushiki Kaisha Optrom  
Sendai-shi Miyagi-ken 989-3124 (JP)

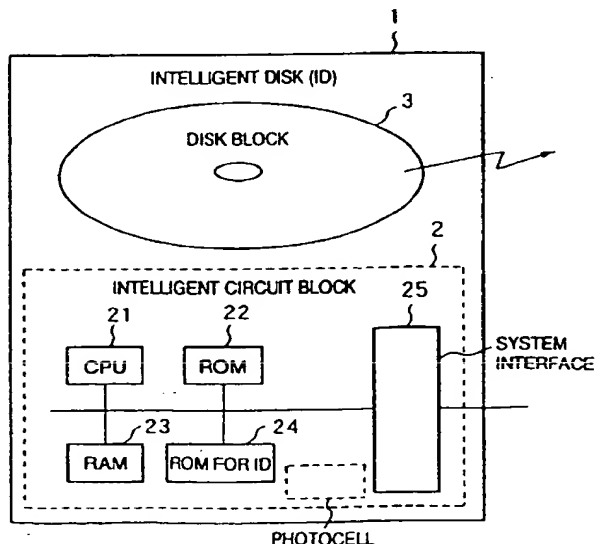
• SAITO, Tetsuo  
Kabushiki Kaisha Optrom  
Sendai-shi Miyagi-ken 989-3124 (JP)  
• KOMAKI, Tsunematsu  
Advanced Electronics Kabushiki  
Taito-ku Tokyo 111-0053 (JP)

(74) Representative: Santarelli, Marc  
Cabinet Rinuy et Santarelli  
14, avenue de la Grande Armée  
75017 Paris (FR)

## (54) STORAGE MEDIUM HAVING ELECTRONIC CIRCUIT AND METHOD OF MANAGING THE STORAGE MEDIUM

(57) The present invention provides a storage medium, such as a disk, that has higher capabilities of preventing reproduction of stored information, providing the security of the information and so on, and a management method thereof. The storage medium is an intelligent disk that has a disk block for storing information and an electronic circuit block for processing information. Furthermore, the electronic circuit block has a ROM for an ID for storing identification information in a rewrite-protected mode at the time of production. Moreover, the disk block and/or the electronic circuit block store a password and/or a digital signature in a rewritable mode at the time of issuing. In addition, the storage medium is identified by the identification information and the password and/or digital signature.

**FIG. 2**



EP 0 919 929 A1

## Description

### Technical Field

[0001] The present invention relates to a storage medium having an electronic circuit and a management method thereof.

### Background Art

[0002] In order to prevent reproduction of data and programs stored in a conventional storage medium, in particular, a disk and to provide security, there have been proposed a disk that stores data for providing security on its surface at the time of information being stored, and a cartridge disk that has memory and a CPU on its cartridge and stores an Identification and the like.

[0003] Nevertheless, hereinafter, if disks are miniaturized to card-sizes and are used as credit cards, electronic purses, and the like, it will become important to prevent reproduction and to protect security. Therefore, above methods are useless

### Disclosure of Invention

[0004] The present invention provides a storage medium, such as a disk, that resolves conventional defects described above and has higher capabilities of preventing the reproduction of stored information, providing the security of the information and so on, and a management method thereof.

[0005] In order to solve this task, the storage medium of the present invention has an information storage block for storing information and an electronic circuit block for processing information. Furthermore, the storage medium is characterized in that the electronic circuit block has storage means for storing identification information in a rewrite-protected mode at the time of production. The information storage block and/or the electronic circuit block store a password and a digital signature in a rewritable mode. In addition, the storage medium is an optical disk.

[0006] Furthermore, a management method of the present invention is a management method of a storage medium having an information storage block for storing information and an electronic circuit block for processing information. Moreover, the management method is characterized in storing identification information in a rewrite-protected mode in the electronic circuit block, at the time of production, storing a password and/or a digital signature in a rewritable mode in the electronic circuit block, at the time of issuing, and identifying the storage medium by the identification information, the password, and/or digital signature. Here, the storage medium is used as a multi-functional smart card. In addition, the storage medium is an optical disk.

[0007] The present invention can provides a storage

medium having higher capabilities for preventing reproductions of stored information, and provides the security of the information, and a management method thereof.

### Brief Description of Drawings

[0008]

Fig. 1 is a drawing of the appearance of an ID used in this embodiment;

Fig. 2 is a drawing of a constructive example of the ID used in this embodiment; and

Fig. 3 is a flow chart of an example of a management procedure used for the ID of this embodiment.

### Best Mode for Carrying Out the Invention

[0009] In order to describe the present invention in more detail, with reference to attached drawings, a storage medium (hereinafter, this is called an intelligent disk (ID) (20)) that has an electronic circuit and is an embodiment of the present invention will be described as an example.

(Constructive example of ID of this embodiment)

[0010] Fig. 1 is a sketch of an intelligent optical disk that is a kind of an ID of this embodiment.

[0011] ID 1 comprises a disk block 3, a disk surface storing information, and an intelligent circuit block 2 mounted, for example, in the central portion of the disk block 3, as shown in Fig. 1. Here, although the circuit block 2 is located in the central portion of the disk, the location is not particularly limited, for example, it can be located on a whole side of the disk surfaces or in a middle layer of a disk manufactured in plural layers.

[0012] Fig. 2 is a drawing showing the concept of the construction of the ID 1.

[0013] In the drawing, the intelligent circuit block 2 has a ROM 22 storing fixed information, and if necessary, the block 2 has a RAM 23 as temporary storage, and a CPU 21 for executing programs stored in the ROM 22 and RAM 23. Furthermore, in case the ID side has an independent power source, a photocell can be included.

[0014] The intelligent circuit block 2 exchanges information with an external apparatus via a system interface 25. The interface can be a contact type or a non-contact type, and a bus-connection type or a communication-connection type. Radio communication, optical communication, and the like are conceivable as the communication method.

[0015] Furthermore, a ROM 24 for an ID where the inherent Identification is written at the time of production/shipping is added to the circuit block 2. As the ROM 24 for an ID, a destructive type of ROM such as a fuse circuit and a capacitor circuit is preferable so as to prevent alteration hereinafter.

(Example of management of ID according to this embodiment)

[0016] Fig. 3 is a chart showing a management procedure of the ID of this embodiment.

[0017] First, at step S31, an inherent Identification is written in the ROM 24 for the ID at the time of production/shipping of the ID.

[0018] Next, at step S32, when the ID shipped is issued (sold), a digital signature is written by its issuing corporation on the disk block 3, or in the ROM 22 or RAM 23 while user's password is also written. In addition, as for writing, either of the digital signature and password can be used according to the objective of the ID.

[0019] If the ID issued is used (information on the disk block 3 is read), the ID and user are identified by using the inherent Identification at the time of production/shipping and the digital signature and/or password at the time of issuing, at step S33.

[0020] If identified, the process goes to step S34 for use of the ID to be permitted, but if not, the process goes to step S35 for the use of the ID to be not permitted.

[0021] In addition, not only the inherent Identification is used for identification, but also the ID can be used as a key for encrypting information stored on the disk block 3. If the inherent ID is used in this manner, security protection of the information stored becomes greater.

[0022] Hereinbefore, the present invention is described with preferred embodiments. Nevertheless, the present invention is not limited to the above-described embodiments and various changes, additions, and modifications can be made within the spirits and scope as set out in the accompanying claims.

## Claims

1. A storage medium that has an information storage block for storing information and an electronic circuit block for processing information, wherein said electronic circuit block having storage means for storing identification information in a rewrite-protected mode at the time of production.
2. The storage medium according to claim 1, where said information storage block and/or said electronic circuit block store a password and a digital signature in a rewritable mode.
3. The storage medium according to any one of claims 1 and 2, where said storage medium is an optical disk.
4. A management method of a storage medium that has an information storage block storing information and an electronic circuit block processing information, the management method comprising:

a step of storing identification information in a rewrite-protected mode in said electronic circuit block at the time of production;

a step of storing a password and/or a digital signature in a rewritable mode in said information storage block and/or said electronic circuit block; and

a step of identifying the storage medium by said identification information and said password and/or digital signature.

5. The management method of a storage medium according to claim 4, wherein said storage medium is used as a multifunctional smart card.
6. The management method of a storage medium according to any one of claims 4 and 5, wherein said storage medium is an optical disk.

FIG. 1

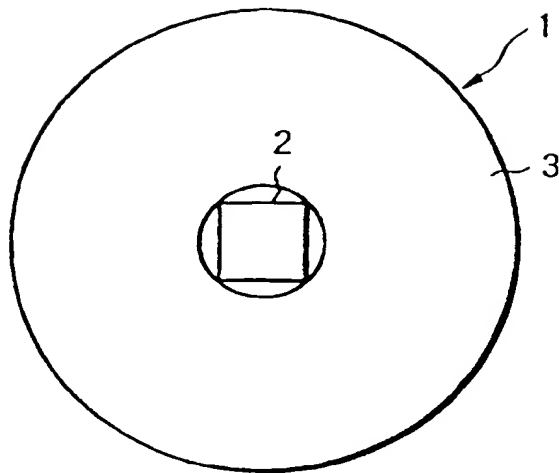


FIG. 2

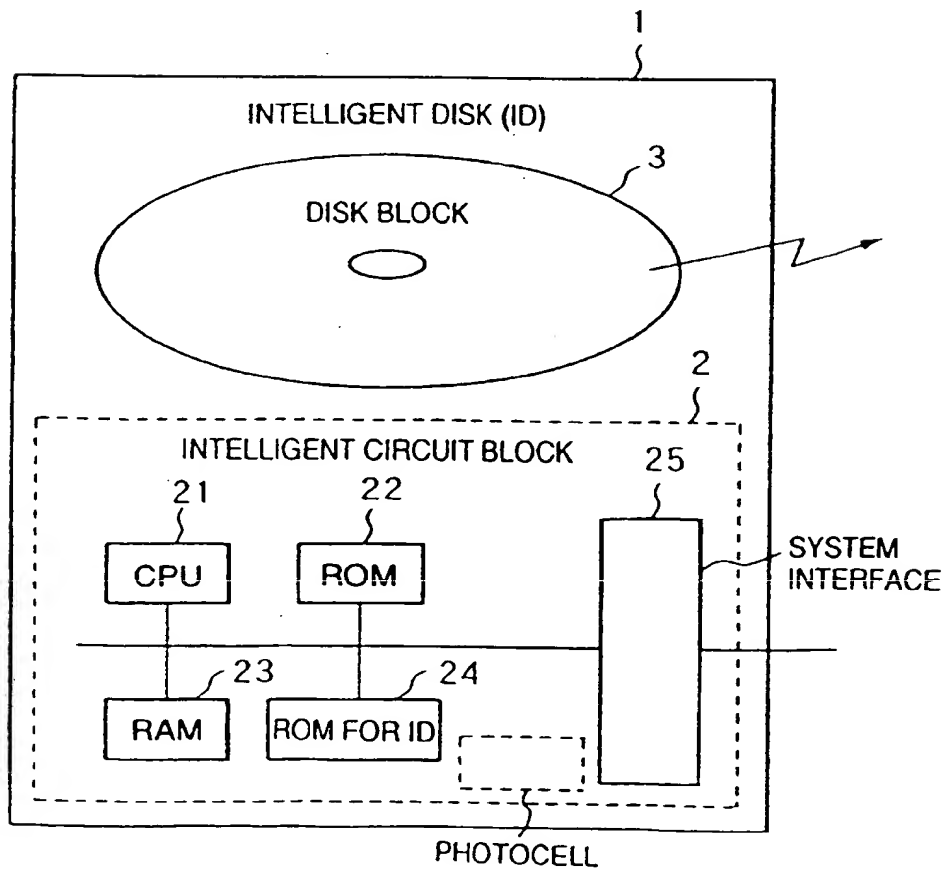
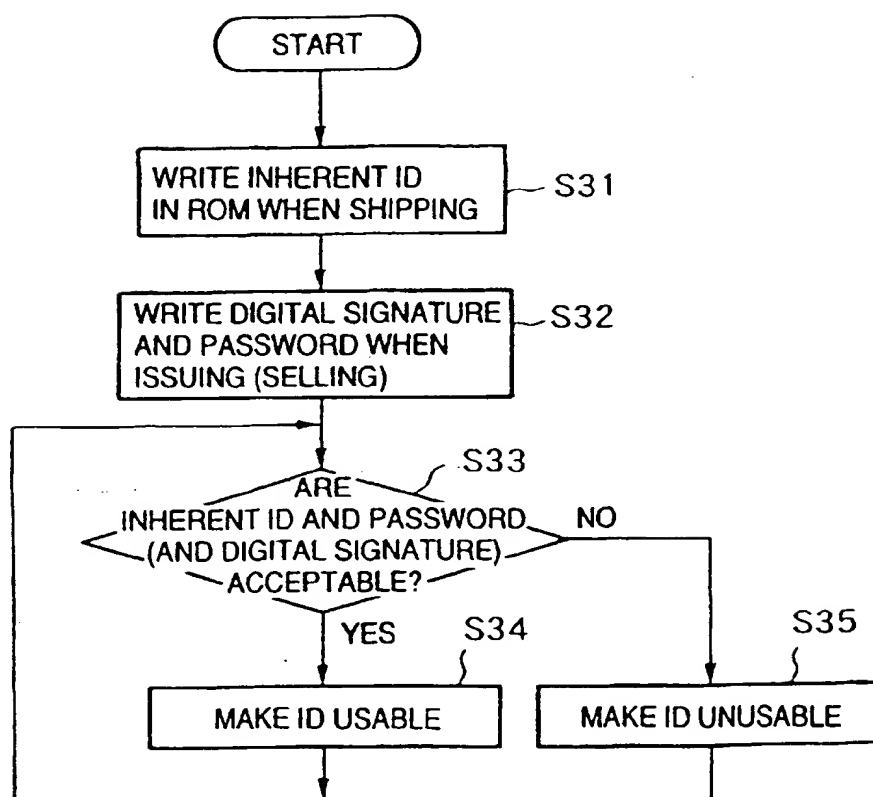


FIG. 3



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP98/02701

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> Int.Cl <sup>6</sup> G06F12/14, G06F15/00, G06F15/76 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) Int.Cl <sup>6</sup> G06F12/14, G06F15/00, G06F15/76, G06K17/00, G06K19/00, G11B23/30 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-1998 Kokai Jitsuyo Shinan Koho 1971-1995 Jitsuyo Shinan Toroku Koho 1996-1998 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, 63-217569, A (Advanced Electronics K.K.), 9 September, 1988 (09. 09. 88) (Family: none)	1-6
Y	JP, 1-263892, A (Toshiba Corp.), 20 October, 1989 (20. 10. 89) (Family: none)	1-6
Y	JP, 2-5158, A (Fujitsu Ltd.), 10 January, 1990 (10. 01. 90) (Family: none)	2-6
A	JP, 1-162286, A (Tohoku Kinzoku Kogyo Ltd.), 26 June, 1989 (26. 06. 89) (Family: none)	1-6
A	JP, 63-7541, A (Brother Industries, Ltd.), 13 January, 1988 (13. 01. 88) (Family: none)	1-6
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 14 September, 1998 (14. 09. 98)		Date of mailing of the international search report 29 September, 1998 (29. 09. 98)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

FIG. 1

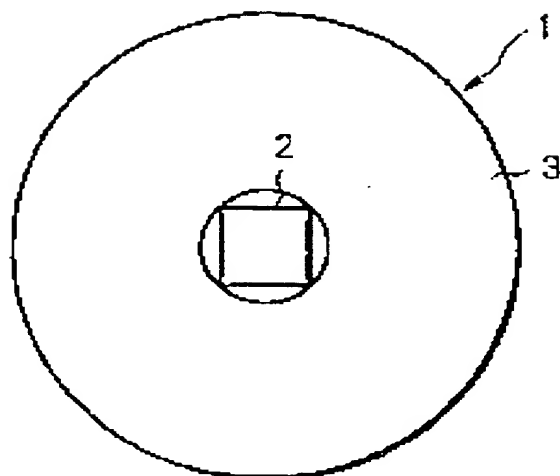


FIG. 2

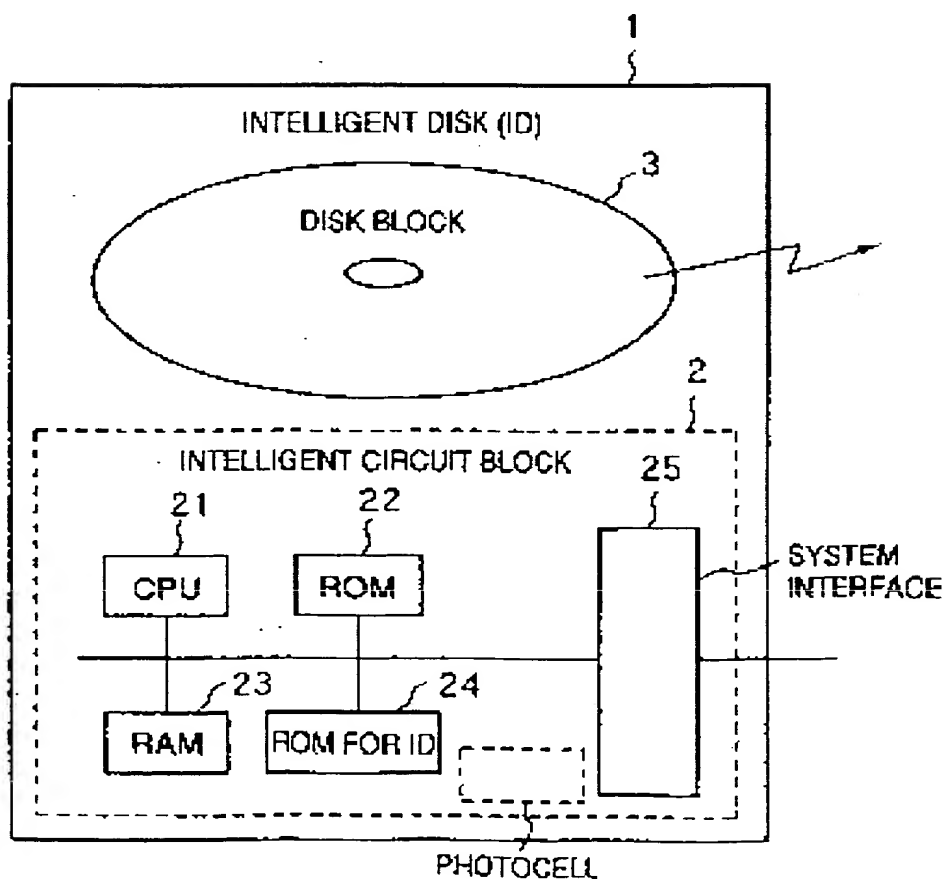


FIG. 3

